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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/807,823	04/19/2001	Masakazu Okuda	DP-548 US	6176

7590

05/03/2002

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EXAMINER

NGUYEN, LAM S

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 05/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/807,823

Applicant(s)

OKUDA, MASAKAZU

Examiner

LAM S NGUYEN

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 8-13 is/are rejected.
- 7) ☒ Claim(s) 7 and 14-17 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☒ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8.
- ☐ Interview Summary (PTO-413) Paper No(s). ____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other:

DETAILED ACTION

Claim Objections

1. Claims 3 and 8 are objected to because of the following informalities: the term “voltage” in the phrase “that reduces the voltage of said pressure generating chamber” should be the term “volume”. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, and 13 are rejected under 35 U.S.C. 102(b) as being obvious by Chang (EP 0947325).

Referring to claims 1, 6, 10, 11, 12, and 13:

Chang discloses a method for driving an ink jet recording head which method applies a driving voltage to an electromechanical converter (in term of “piezoelectric”) (column 1, line 8) to deform the electromechanical converter to thereby change a pressure in the pressure generating chamber filled with ink (FIG. 3, element 2), thus ejecting ink droplets through a nozzle (FIG. 3, element 13) in communication with the pressure generating chamber, the method being characterized in that a voltage waveform of said driving voltage comprises:

at least a first voltage changing process (FIG. 4(b), element b) for applying a voltage in a direction that increases a volume of said pressure generating chamber;

Art Unit: 2853

a second voltage changing process (in term of “a first contraction region”) (FIG. 4(b), element d) (column 13, line 5) for then applying a voltage in a direction that reduces the volume of said pressure generating chamber;

and a third voltage changing process (in term of “first expansion region”) (FIG. 4(b), element f: T1) (column 13, line 13-14) for applying a voltage in a direction that increases the volume of said pressure generating chamber again, and voltage changing times t_2 and t_3 during the second and third voltage changing processes are set to have such lengths as shown below, relative to a resonance frequency T_c , of a pressure wave generated in the pressure generating chamber:

$$0 < t_2 < T_c/2 \text{ (column 7, line 15-19)}$$

$$0 < t_3 < T_c/2 \text{ (column 13, line 48-49)}$$

Referring to claim 2: a start time to said third voltage changing process is about the same as an end time of said second voltage changing process (column 13, line 10-11: the width of a third hold region e is approximately 0)

Referring to claims 3 and 8: Assumed that the term “voltage” in the phrase “that reduces the voltage of said pressure generating chamber” is changed to “volume”, the following rejection is made: a fourth voltage changing process (in term of “the second contract region”) (FIG. 4(b), element h; column 14, line 15) for applying a voltage in a direction that reduces the volume of said pressure generating chamber, after said first voltage changing process, said second voltage changing process, and said third voltage changing process

Referring to claim 4: a voltage changing time t_4 during said fourth voltage changing process (in term of “the second contract region”) (FIG. 4(b), element h; column 14, line 15) is set

Art Unit: 2853

as follows relative to the resonance frequency T , of the pressure wave generated in said pressure generating chamber:

$$0 < t_4 < T/2 \text{ (column 7, line 15-19)}$$

Referring to claims 5 and 9: a time interval between a start time of said second voltage changing process and a start time of said fourth voltage changing process is set substantially half the length of the resonance frequency T_c of the pressure wave generated in said pressure generating chamber (column 16, line 3 teaches that the widths of the expansion region and the contraction region are equal. In addition; column 13, line 49 suggests that the width of the expansion region is no more than $\frac{1}{4} T_c$ (means that it may be equal to $\frac{1}{4} T_c$). Moreover; column 13, line 10-11 recommends that the width of the third hold region is approximately 0. Therefore, the time interval between a start time of said second voltage changing process and a start time of said fourth voltage changing process is substantially half the length of the resonance frequency T_c)

Allowable Subject Matter

3. Claims 7, 14, 15, 16, 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The best references found are Keeling et al. (US 5481288) and Nicholls et al. (US 5453121). Even though, Keeling et al. discloses an ink jet recording head with the nozzle of 20 to 40 micrometers opening diameter (column 7, line 9-10) to produce smallest size drops, Keeling et al. does not specify the size of the drops. Moreover, Nicholls et al. teaches droplets having size in the range of 14 to 20 micrometers ejected by nozzles having diameter in the range of 7.5 to 10 micrometers. Therefore, both fail to disclose an ink jet recording head with the

Art Unit: 2853

nozzle of 20 to 40 micrometers opening diameter is driven to eject ink droplets of 5 to 25 micrometers in size.

Conclusion

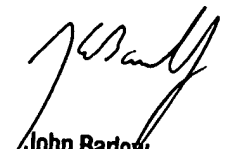
Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (703)305-3342. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JOHN E BARLOW can be reached on (703)308-3126. The fax phone numbers for the organization where this application or proceeding is assigned are (703)305-3431 for regular communications and (703)305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

LN

April 28, 2002


John Barlow
Supervisory Patent Examiner
Technology Center 2800